

and is carried off by the solution, and so leaves the case in a very simple state; the fact, however, is as strong with any of the other metals. Now if the contact theory be true, and if the iron, platina, and solution of sulphuret of potassium give contacts which are in perfect equilibrium as to their electromotive force, then why does changing the iron for zinc destroy the equilibrium? Changing one metal for another in a metallic circuit causes no alteration of this kind: nor does changing one substance for another among the great number of bodies which, as solid conductors, may be used to form conducting (but chemically inactive) circuits (855, etc.). If the solution of sulphuret of potassium is to be classed with the metals as to its action in the experiments I have quoted (813, etc.), then, how comes it to act quite unlike them, and with a power equal to the *best* of the other class, in the new case; of zinc, copper, silver, etc. (870, 873, etc.)?

853. This difficulty, as I conceive, must be met, on the part of the contact theorists, by a new assumption, namely, that this fluid sometimes acts as the *best* of the metals, or first class of conductors, and sometimes as the *best* of the electrolytes or second class. But surely this would be far too loose a method of philosophising in an experimental science (857); and further, it is most unfortunate for such an assumption, that this second condition or relation of it never comes on by itself, so as to give us a pure case of a current from contact alone; it never comes on *without* that chemical action to which the chemist so simply refers all the current which is then produced.

854. It is unnecessary for me to say that the same argument applies with equal force to the cases where nitrous acid, nitric acid, and solution of potash are used; and it is supported with equal strength by the results which they have given (831, 837, 841).

855. It may be thought that it was quite unnecessary, but in my desire to establish contact electromotive force, to do which I was at one time very anxious, I made many circuits of three substances, including a galvanometer, all being conductors, with the hope of finding an arrangement, which, without chemi-

cal action, should produce a current.
The number and variety
of these experiments may be
understood from the following
summary; in which metals, plumbago,
sulphurets and oxides,
all being conductors even of a thermo
current, were thus com-
bined in various ways: